

REMARKS

This application has been reviewed in light of the Office Action dated October 6, 2006. Claims 1-15 and 17 have been cancelled without prejudice or disclaimer of the subject matter presented therein. Consequently, Claims 16 and 18-26 are now pending, with Claims 16 and 21 in independent form. Claims 16 and 21 have been amended, as discussed below.

All of the pending claims stand rejected under 35 U.S.C. § 101 because the claimed invention is allegedly directed to non-statutory subject matter. In response, independent Claims 16 and 21 have been amended to recite “applying said M level digital image to an image output device”. The added recitation is supported at least by the Background of the Invention which discusses the problems solved by the claimed invention in image output devices, such as printing devices. These claims and all the other dependent claims are respectfully submitted to satisfy the requirements of 35 U.S.C. §101. Reconsideration and withdrawal of this rejection is therefore requested.

Claims 16 and 21-23 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Murayama (U.S. Patent No. 5,936,684) in view of Revankar (U.S. Patent No. 5,649,025). Claims 18 and 24 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Murayama (U.S. Patent No. 5,936,684) in view of Revankar (U.S. Patent No. 5,649,025) and Ishiguro (U.S. Patent No. 6,501,566 B1). Claim 19 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Murayama (US 5,936,684) I view of Revankar (U.S. Patent No. 5,649,025), Merickel (U.S. Patent No. 4,945,478) and Eschbach (U.S. Patent No. 5,565,994). Claim 20 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Murayama (U.S. Patent No. 5,936,686) in view of Revankar (U.S. Patent No. 5,649,025), Merickel (U.S. Patent No. 4,945,478), Eschbach (U.S. Patent No. 5,565,994), and Klassen (U.S. Patent No. 5,621,546). Claim 25 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Murayama (U.S. Patent No. 5,936,684) in view of Revankar (U.S. Patent No. 5,649,025) and Eschbach (U.S. Patent No. 5,565,994). Claim 26 sands rejected under 35 U.S.C. §103(a) as being unpatentable over Murayama (U.S. Patent No. 5,936,684) in view of Revankar (U.S. Patent No. 5,659,025), Eschbach (U.S. Patent No. 5,565,994) and Klassen (U.S. Patent No. 5,621,546).

Applicants respectfully submit that amended independent claims 16 and 21 are patentable over the cited references, taken separately or in any proper combination for at least the following reasons.

Amended independent Claim 16 requires a method for multitone processing an N level digital image to produce an M level digital image wherein M and N have unchanging values and $M < N$. The method includes clustering all of the pixel values of the N level image into M reconstruction levels based on the gray level distribution of the N level image. The clustering produces K clusters of pixel values, and wherein $K = M$. The method also includes repeatedly revising the K clusters of pixel values until error between the N level digital image and the M level digital image is minimized. Throughout the repeated revising of the K clusters, the number of clusters K does not change. In addition, the method includes applying multilevel error diffusion to the N level digital image using the M reconstruction levels to produce the M level digital image, and applying the M level digital image to an image output device.

A notable feature of Claim 16 is that throughout the repeated revising of said K clusters, the number of clusters K does not change. Support for this feature can be found in the specification at least at page 4, line 21 to page 5, line 15, which is described with reference to FIGS. 2, 5, and 6. These portions of the specification illustrate a recalculation, or shifting, of cluster centers. Cluster centers are neither added or removed by the repeated revision process.

The Office Action states, and Applicants agree, that the Murayama Patent “does not disclose expressly repeatedly revising said clustering of said pixel values . . .” (See pg. 21, last paragraph of the Office Action). In addition, Applicants respectfully submit that the Revankar Patent (also cited in the rejection of Claim 16) does not teach or suggest repeated revising of K clusters, wherein throughout such repeated revising, the number of clusters K does not change. In particular, the Revankar Patent is understood to incrementally generate a plurality of thresholds (which are apparently referred to by the Office Action as corresponding to ‘clusters’) as part of its recursive thresholding processes 204, 206. See col. 5, lines 6-15 and col. 6, lines 25-31. Of the plurality of thresholds generated by recursion, the Revankar Patent is understood to teach selecting a subset of thresholds meeting ‘goodness’ criteria. See col. 5, lines 16-40. Accordingly, Applicants understand the Revankar Patent’s recursive threshold

generation process to increase the number of 'clusters' and its subsequent selection of only a subset of the 'best' thresholds to thereafter decrease the number of 'clusters.' Claim 16, however, requires that throughout its repeated revising of said K clusters, the number of clusters K does not change.

For at least these reasons, Claim 16 is respectfully submitted to be patentable over the Murayama Patent and the Revankar Patent, taken separately or in any proper combination. No other reference is cited as teaching or suggesting the above-discussed features of Claim 16.

Independent Claim 21 requires, among other things, setting initial values of M cluster centers; assigning pixels of the N level digital image to the cluster centers to provide assigned pixels; and calculating new values of the cluster centers based upon respective the assigned pixels. The Murayama Patent is understood to pick fixed threshold values. See col. 8, lines 23-49. Although it is not explicit, the Office Action appears to agree with Applicants' understanding in this regard. See page 23 of the Office Action. In addition, the Revankar Patent, as described above, is understood to recursively generate a plurality of thresholds, and then to pick a subset of the 'best' thresholds. Applicants, however, have not found any teaching or suggestion of calculating new values of the cluster centers, as required by Claim 21. In particular, calculating new values of cluster centers is akin to shifting a cluster center, and the Revankar Patent is not understood to include any such teaching or suggestion.

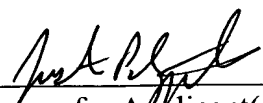
For at least this reason, Claim 21 is respectfully submitted to be patentable over the Murayama Patent and the Revankar Patent, taken separately or in any proper combination. No other reference is cited as teaching or suggesting the above-discussed feature of Claim 21.

The other claims in this application depend from one of the independent claims discussed above and, therefore, also are submitted to be patentable for at least the same reasons. Since each dependent claim is deemed to define an additional aspect of the invention, individual reconsideration of the patentable of each claim on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicants

respectfully request favorable reconsideration and the allowance of the present application.

Respectfully submitted,



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